A STATUS REPORT ON ENVIRONMENTAL MANAGEMENT AT THE INEEL

INEEL REPORTER Supplement

1999

# Progress

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Cover photographs:

*Above:* Warm Waste Ponds at the Test Reactor Area.
*Below:* Low-level waste disposal at the Radioactive Waste Management Complex.

# Environmental Management

## Introduction

The primary mission of the Idaho National Engineering and Environmental Laboratory (INEEL) Environmental Management Program is to reduce threats to health and safety posed by contamination and waste at the INEEL. This mission is realized through:

- Safe storage, treatment, and disposal of high-level waste, transuranic waste, mixed low-level waste, low-level waste, hazardous waste, industrial and commercial waste, and spent nuclear fuel
- Environmental investigation and cleanup actions
- Decontamination and dismantlement of facilities.

In all environmental management activities at the INEEL, the public is encouraged to provide input.

This report presents a brief overview of the INEEL Environmental Management Program, highlighting the activities conducted in 1998. It also previews activities that are ongoing or are scheduled to begin in 1999 and beyond.

Environmental management activities, including cleanup and decontamination and dismantlement work, take place at every INEEL facility. Figure 1 shows the facility locations.

### Environmental Management Activities

Storage
- Test Area North ***(Spent Nuclear Fuel)***
- Test Reactor Area ***(Spent Nuclear Fuel)***
- Idaho Nuclear Technology and Engineering Center ***(Low-Level, Mixed Low-Level and High-Level Waste; Spent Nuclear Fuel)***
- Power Burst Facility/Auxiliary Reactor Area ***(Spent Nuclear Fuel)***
- Waste Experimental Reduction Facility ***(Low-Level and Mixed Low-Level Waste)***
- Radioactive Waste Management Complex ***(Transuranic Waste)***
- Naval Reactors Facility ***(Spent Nuclear Fuel)***
- Argonne National Laboratory–West ***(Spent Nuclear Fuel and Transuranic Waste)***

Treatment
- Idaho Nuclear Technology and Engineering Center ***(High-Level Waste)***
- Central Facilities Area ***(Commercial/Industrial Waste)***
- Waste Experimental Reduction Facility ***(Low-Level and Mixed Low-Level Waste)***

Disposal
- Central Facilities Area ***(Commercial/Industrial Waste)***
- Radioactive Waste Management Complex ***(Low-Level Waste)***

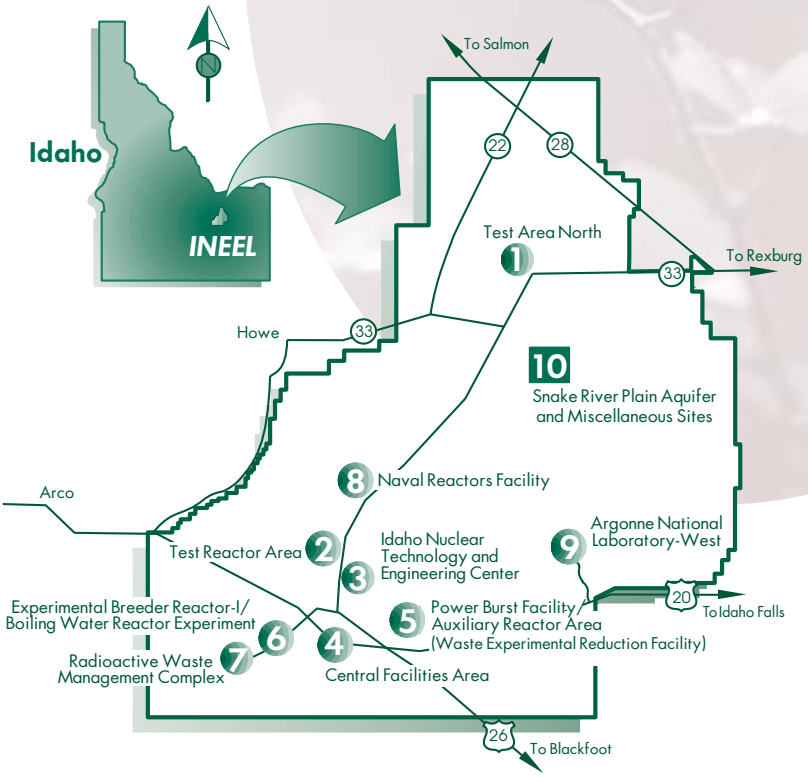



Figure 1. Facilities at the INEEL with their associated waste area group numbers.

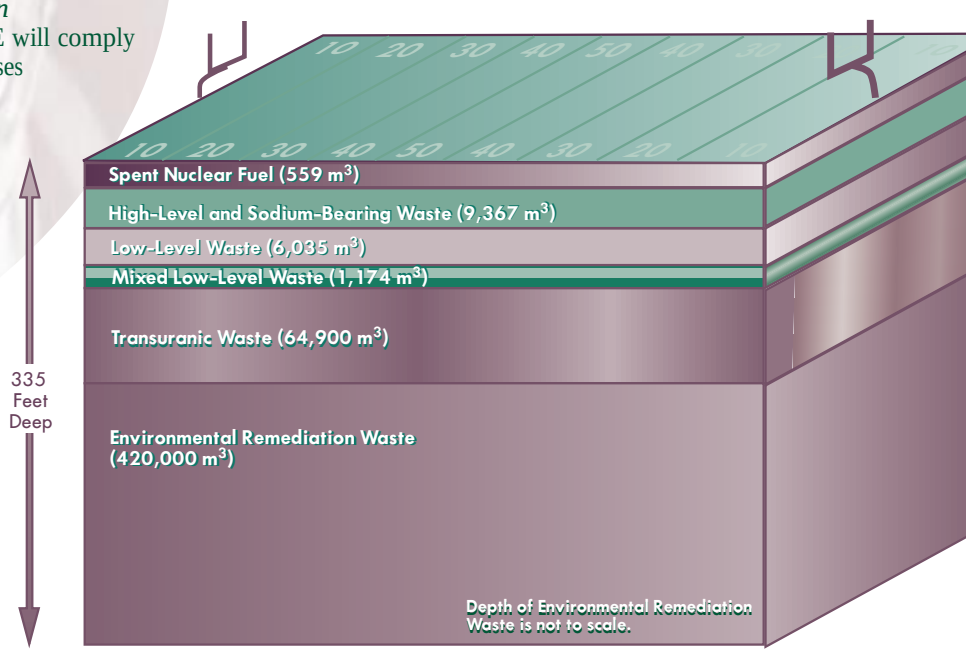
# Storage, Treatment and Disposal at the INEEL

The INEEL's Waste Management Program manages a variety of wastes that require treatment, storage and eventual disposal. Some of these materials are generated by ongoing operations. Most, however, are a legacy of historic operations and the Cold War. Treatment, storage and disposal of spent nuclear fuel and radioactive waste at the INEEL are guided by two major agreements:

- The *1995 Settlement Agreement/Court Order*
  The court-ordered agreement among the U.S. Department of Energy, the U.S. Navy and the state of Idaho that resolved legal disputes regarding the receipt of spent nuclear fuel at the INEEL, and guides the management of spent nuclear fuel, transuranic waste and other radioactive waste at the INEEL for the next 40 years.
- The *INEEL Site Treatment Plan*
  The plan governs how the DOE will comply with the federal law that addresses management of mixed low-level waste at the INEEL. It also governs treatment of incinerable mixed low-level waste from across the DOE complex. The plan, approved by the state of Idaho in 1995, provides the means to regulate mixed waste at the INEEL.

The current INEEL waste and spent nuclear fuel inventory is illustrated in the diagram at the right.

Environmental remediation waste is the material expected to be generated by cleaning up contaminated soil and groundwater at the INEEL.




The Waste Management logo is an inverted triangle that represents the INEEL's environmentally focused waste philosophy:

- Minimize creation of new waste
- Reduce the size and quantity of waste through treatment
- Dispose of waste safely
- Move waste efficiently through the storage, treatment and disposal process

# Spent Nuclear Fuel

## 1998 Accomplishments

- Moved 518 spent nuclear fuel units from outdated wet storage in the south basin of the Idaho Nuclear Technology and Engineering Center facility CPP-603 to new wet storage at Idaho Nuclear Technology and Engineering Center facility CPP-666
- Constructed a temporary dry storage facility at the Idaho Nuclear Technology and Engineering Center to hold spent fuel and core debris from Three Mile Island
- Submitted the operating license for the Three Mile Island dry storage facility to the Nuclear Regulatory Commission for review
- Completed an Environmental Assessment for the Three Mile Island dry storage facility
- Began operating a new drying/canning facility where spent nuclear fuel will be dried, repackaged and prepared for dry storage

Spent nuclear fuel is fuel that has been irradiated in a nuclear reactor to the point that it no longer efficiently contributes to the nuclear chain reaction. It contains a broad array of radionuclides with varying half-lives, some of which are very long. Spent nuclear fuel is extremely radioactive and thermally hot. The DOE will not classify spent nuclear fuel as waste until the material is disposed of in a permanent geologic repository.

The INEEL has 559 cubic meters of spent nuclear fuel in inventory. The fuel, managed by the DOE, originates at a variety of sources, including research reactors at the INEEL, U.S. Navy submarine and surface-ship propulsion reactors, the decommissioned Fort St. Vrain power plant in Colorado, the damaged core from the Three Mile Island power plant in Pennsylvania, and university and foreign research reactors.

The U.S. accepts spent nuclear fuel from foreign research reactors to reduce the threat of nuclear terrorism in the world. The fuel contains uranium that was enriched in the U.S. and initially exported in the "Atoms for Peace" program. Some of this fuel is stored at the INEEL. On July 23, 1998, the INEEL received a shipment of spent nuclear fuel from the Republic of Korea (South Korea). In 1999, the INEEL plans to receive a consolidated shipment of foreign fuel from Europe (Italy, Germany, Slovenia and Romania).

The 1995 Settlement Agreement requires that all DOE- and U.S. Navy-owned spent nuclear fuel leave Idaho by January 1, 2035. To prepare the fuel to leave Idaho, the INEEL is consolidating spent nuclear fuel at the Idaho Nuclear Technology and Engineering Center and moving fuel from wet to dry storage. Dry storage is advantageous because it is a less corrosive environment and is less expensive to monitor. In addition, fuel must be in dry storage to prepare it for transport. Preparation for transport includes repackaging spent nuclear fuel into containers that meet the requirements of either an interim storage site or a permanent geologic repository.

## 1999 Goals

- Move additional Three Mile Island spent nuclear fuel and core debris into the new Idaho Nuclear Technology and Engineering Center dry storage facility (began on March 31, 1999)
- Issue the Record of Decision for preparing DOE-owned fuel for shipment using canisters (issued April 27, 1999)
- Continue moving spent nuclear fuel units from the south basin of Idaho Nuclear Technology and Engineering Center facility CPP-603 to Idaho Nuclear Technology and Engineering Center facility CPP-666 (scheduled completion is December 31, 2000)
- Develop a schedule for transferring all spent nuclear fuel into dry storage

Spent nuclear fuel cask. These casks are used to safely transport spent nuclear fuel.

## High-Level Waste

High-level waste is radioactive, containing long-lived radionuclides and hazardous substances such as acids, caustics, metals and organic solvents. High-level waste at the INEEL resulted from the chemical reprocessing of spent nuclear fuel to extract uranium. It contains a combination of fission products, uranium and transuranic elements in concentrations that require permanent isolation. High-level waste was produced as a liquid as a result of spent fuel reprocessing; it also includes the solid forms derived from the liquid form.

The INEEL has approximately 4,000 cubic meters of high-level waste in inventory, the result of 40 years of reprocessing spent nuclear fuel at the Idaho Nuclear Technology and Engineering Center. Reprocessing ceased in 1991. Other waste managed by the high-level waste program at the INEEL includes debris, discarded high-efficiency particulate air (HEPA) filters and sodium-bearing liquid waste.

Beginning in 1963, the INEEL began calcining (evaporating and oxidizing) its acidic liquid high-level waste into solid form. Calcined high-level waste is more stable and easier to handle than high-level liquid waste and calcining achieves a volume reduction of 4-to-1 or greater. The calcine is stored in stainless steel bins within concrete vaults.

### 1998 Accomplishments

- Completed calcining liquid high-level waste on February 20, 1998 significantly ahead of schedule
- Developed and demonstrated sampling methods for calciner off-gas emissions, both at a laboratory and pilot-plant scale
- Began calcining 1.4 million gallons of sodium-bearing waste

### 1999 Goals

- Complete for public review and comment the draft Environmental Impact Statement for treating and disposing of calcined high-level waste
- Continue calcining sodium-bearing liquid waste to obtain calciner performance data

## Transuranic Waste

Transuranic waste contains alpha-emitting elements with an atomic number greater than 92 (the atomic number for uranium), with radioactivity greater than 100 nanocuries per gram of waste and a half-life greater than 20 years. Common constituents of transuranic waste are the elements plutonium and americium. Transuranic waste can remain dangerously radioactive for hundreds of thousands of years. Unlike high-level waste, which is generated from only a few specific processes and has a narrow range of characteristics, transuranic waste exists in many different forms and can contain an array of hazardous chemicals. Most transuranic waste is the result of weapons production at facilities other than INEEL.

The INEEL has approximately 65,000 cubic meters of transuranic waste in inventory, the largest inventory of transuranic waste of any DOE site. The principle radionuclides in the INEEL's transuranic waste are plutonium and americium. Much of the transuranic waste at the INEEL consists of plutonium-contaminated protective clothing, filters, containers and tools. Because most of the INEEL's inventory of transuranic waste also contains hazardous substances, it is managed and characterized using regulations and criteria governing hazardous materials.

Inventoried transuranic waste at the INEEL is contained in approximately 130,000 55-gallon drums and 11,000 boxes, approximately 310,000 55-gallon drum equivalents. Most of this transuranic waste is stored above ground at the Radioactive Waste Management Complex; a small amount is stored at the Argonne National Laboratory–West.

1 800 708-2680

Transuranic waste in Resource Conservation and Recovery Act–approved storage at the Radioactive Waste Management Complex.

In addition to stored transuranic waste, approximately 57,500 cubic meters of transuranic waste is buried at the Subsurface Disposal Area of the Radioactive Waste Management Complex. Most of the buried transuranic waste resulted from weapons production at the Rocky Flats Plant near Denver, Colorado, and was buried prior to 1970. Activities are ongoing to provide information for determining long-term management of this buried transuranic waste (see Radioactive Waste Management Complex on page 18 for more information on buried waste).

DOE's Waste Isolation Pilot Plant, a deep geologic repository near Carlsbad, New Mexico, is now accepting transuranic waste without hazardous constituents. The first waste shipment was accepted from DOE's Los Alamos National Laboratory on March 26, 1999. The INEEL sent its first shipment of transuranic waste to the WIPP on April 27, 1999, meeting the 1995 Settlement Agreement requirement to begin shipping transuranic waste out of Idaho by April 30, 1999.

The INEEL has been characterizing its transuranic waste to determine the condition and content of containers, the amounts and types of radioactive material within the containers, the amounts and types of hazardous constituents (such as organic solvents and metals) that are present, and the presence of prohibited materials (such as liquids or aerosol cans). Some transuranic waste at the INEEL does not meet the WIPP's waste acceptance criteria. This waste, identified in the characterization process, will require treatment and repackaging to meet the WIPP's criteria.

The Advanced Mixed Waste Treatment Facility, to be located at the Radioactive Waste Management Complex, is scheduled to begin treating and repackaging transuranic waste to meet the WIPP's criteria beginning March 2003. Construction of the facility is slated to begin in 1999.

## 1998 Accomplishments

- Received certification from DOE-Carlsbad Area Office on April 29, 1998, which allows INEEL to certify waste for WIPP disposal
- Characterized 2,504 drums of transuranic waste at the Stored Waste Examination Pilot Plant
- Completed intrusive characterization of 117 drums at Argonne National Laboratory–West
- Completed management assessment of the drum vent facility, which measures gasses in waste-containing drums to ensure they are safe to transport

## 1999 Goals

- Initiate shipment of transuranic waste out of Idaho by April 30, 1999 (the first shipment left on April 27, 1999)
- Certify that 2,800 drums of transuranic waste meet the WIPP's waste acceptance criteria
- Perform intrusive examinations of 125 drums of transuranic waste

# Low-Level Waste

Low-level waste is radioactive material that is not classified as high-level waste, transuranic waste, spent nuclear fuel or natural uranium and thorium byproduct material. Low-level waste that contains hazardous substances is categorized as mixed low-level waste and managed differently. Most nuclear activities generate low-level waste at some point. These activities include weapons production, spent fuel reprocessing, facility deactivation, and treatment and handling of transuranic waste and mixed low-level waste. Much of the low-level waste at the INEEL consists of contaminated rugs, wood, tools, soils and personal protective equipment.

## 1998 Accomplishments

- Disposed of 3,264 cubic meters of low-level waste at the Radioactive Waste Management Complex
- Treated 3,690 cubic meters of low-level waste at the Waste Experimental Reduction Facility

The INEEL has 4,700 cubic meters of low-level waste in inventory and is projected to generate about 115,000 cubic meters of additional low-level waste in the next 35 years. New waste will come from decontamination and dismantlement of various facilities at the INEEL, treating and characterizing other waste streams and ongoing processes.

The INEEL disposes of its low-level waste in the active pit at the Radioactive Waste Management Complex Subsurface Disposal Area. Prior to disposal, some low-level waste is incinerated, sized or compacted at the Waste Experimental Reduction Facility, reducing the overall volume and improving safety in handling.

A major improvement to the low-level waste program in 1998 was the introduction of soft-sided containers for disposal of contaminated soil and debris. Soft-sided containers are large, cube-shaped bags made of three layers of woven polypropylene with integrated nylon lifting straps. As safe to handle as the steel and wood containers they replace, the soft-sided containers are easier to load, hold more than four times as much waste and allow more efficient use of space within the disposal pit. Compared to steel and wood containers, they save approximately $14 and $19 per cubic foot, respectively.

## 1999 Goals

- Dispose of 6,500 cubic meters of low-level waste at the Radioactive Waste Management Complex
- Treat 5,200 cubic meters of low-level waste at the Waste Experimental Reduction Facility
- Reduce the backlog of contact-handled low-level waste awaiting disposal in the active pit to less than 2,000 cubic meters

Low-level waste is disposed of in the active pit at the Radioactive Waste Management Complex.

www.inel.gov/environment/em

# Mixed Low-Level Waste

## 1998 Accomplishments

- Completed a high-temperature trial burn at the Waste Experimental Reduction Facility under the Resource Conservation and Recovery Act
- Incinerated 126.5 cubic meters of the INEEL's mixed low-level waste and 79 cubic meters of mixed low-level waste from other DOE facilities
- Dismantled 10.88 cubic meters of lead casks
- Disposed of 12.7 cubic meters of fly ash

Mixed low-level waste contains both radioactive waste subject to the Atomic Energy Act and hazardous waste subject to the Resource Conservation and Recovery Act. Mixed low-level waste can contain a broad spectrum of radionuclides, depending upon its source. Hazardous constituents may include metals, organic solvents, cyanides, explosive compounds and acids and caustics. Like low-level waste, mixed low-level waste is generated through a broad array of processes and activities. Mixed low-level waste is managed separately from ordinary low-level waste because of its hazardous content. In contrast, high-level waste and transuranic waste, which often contain hazardous components, are managed primarily for their radioactive components rather than their hazardous components.

The INEEL has 1,174 cubic meters of mixed low-level waste in inventory, most of it resulting from activities other than weapons production.

The INEEL serves as a regional treatment center for DOE mixed low-level waste. The INEEL's Waste Experimental Reduction Facility is currently the DOE's only incinerator licensed to treat solid mixed low-level waste generated at other DOE facilities. The state of Idaho has approved this facility to treat more than 840 cubic meters of incinerable mixed low-level waste currently stored throughout the DOE complex and an estimated 1,600 cubic meters expected to be generated in the next five years. The Waste Experimental Reduction Facility is not approved to treat some of the INEEL's mixed low-level waste. The INEEL plans to ship this waste to treatment facilities outside the state of Idaho when these facilities are approved.

The INEEL plans to fully treat incinerated waste through ash stabilization or macroencapsulation. Several new and proposed regulations may delay start-up of the INEEL's mixed low-level waste treatment units for approximately one year. In 1999, the EPA plans to publish its "Maximum Achievable Control Technology" regulation. The proposed regulation has an aggressive compliance schedule that may negatively affect the Waste Experimental Reduction Facility's ability to meet the 1995 Site Treatment Plan commitments.

## 1999 Goals

- Reduce the incinerable mixed low-level waste backlog by 25 percent
- Dismantle seven lead casks to complete 75 percent of the lead cask backlog
- Treat and dispose of 50,000 pounds of lead classified as mixed low-level waste
- Complete 10 incineration campaigns at the Waste Experimental Reduction Facility
- Obtain permits needed to begin ash stabilization and waste macroencapsulation at the Waste Experimental Reduction Facility

## Hazardous Waste

Hazardous waste is defined as a solid waste, or as a liquid or gaseous waste in a container, that exhibits one or more characteristics of corrosivity, ignitability, reactivity or toxicity, or is listed in EPA regulations as a hazardous waste. Waste defined as hazardous is not radioactive. Hazardous waste is regulated by the Resource Conservation and Recovery Act and corresponding state regulations. It is generated by many everyday activities of industry, businesses, farms and homes.

### 1998 Accomplishments

- Transported 177 cubic meters of hazardous waste to commercial disposal sites

At the INEEL, hazardous waste consists primarily of process waste, organic solvents, lead and lead-contaminated debris, and laboratory packs of unused and out-of-date material. Hazardous waste generated at the INEEL is characterized, treated and disposed of within a 90-day time frame. It is shipped out of Idaho to commercial facilities for treatment and disposal.

### 1999 Goals

- Reduce the time needed to characterize, treat and dispose of hazardous waste after generation

## Industrial and Commercial Waste

Industrial and commercial waste is generated by business establishments such as stores, offices, restaurants and manufacturing. It can contain substances such as asbestos, but not hazardous or radioactive components.

### 1998 Accomplishments

- Recycled or cubed 20 percent of industrial and commercial waste generated at the INEEL
- Saved approximately $224,000 in landfill fees, coal purchases and security costs

Historically, industrial and commercial waste was disposed of at the INEEL in landfills. Currently, the INEEL annually generates between 46,000 and 85,000 cubic meters of uncompacted, solid, industrial and commercial waste for disposal or recycling.

The INEEL seeks to reduce the amount of industrial and commercial waste it disposes of in landfills at the Central Facilities Area and Bonneville County. One method used to achieve this goal is to burn scrap lumber, office paper and flammable, non-hazardous construction and demolition debris at the Idaho Nuclear Technology and Engineering Center's Coal-Fired Steam Generation Facility. These waste materials are shredded and pressed into cubes, then mixed with coal and burned to generate process and heating steam for the Idaho Nuclear Technology and Engineering Center. Some sensitive documents that formerly required a security presence during their destruction are now made into fuel cubes.

### 1999 Goals

- Increase on-site waste recycling from 20 percent to 33 percent
- Process approximately 34,000 cubic meters of industrial and commercial waste

1 800 708-2680

# Cleanup at the INEEL

Between the 1950s and the 1980s, operations and research activities at the INEEL left behind contaminants that could pose a risk to human health and the environment. Because of this, the U.S. Environmental Protection Agency placed the INEEL on the National Priorities List of hazardous waste sites in 1989. This action marked the beginning of the INEEL's Environmental Restoration Program. The cleanup process and schedule for the INEEL was outlined in the Federal Facility Agreement and Consent Order, signed by the state of Idaho, the DOE and the EPA in 1991.

In the last decade, 21 environmental investigations have been completed at the INEEL. Five additional investigations are in progress. To date, these investigations have resulted in 17 signed Records of Decision. Remediation activities for 10 of the signed Records of Decision are complete; remediation activities for the remaining seven signed Records of Decision are in progress. Four Records of Decision are currently pending.

During 1998, three comprehensive environmental investigations were completed: for Test Area North, the Idaho Nuclear Technology and Engineering Center and the Power Burst Facility/Auxiliary Reactor Area. In addition, two Records of Decision were signed: for the Naval Reactors Facility and Argonne National Laboratory–West. Other significant events included reissue of the Test Area North Proposed Plan, proposal of an on-site disposal facility at the Idaho Nuclear Engineering and Technology Center and resumption of Pit 9 remediation.

A revised Proposed Plan for Test Area North was issued in November 1998. The original plan, released in February 1998, was withdrawn as the result of public input. In response, a public focus group was convened whose recommendations were incorporated into the revised plan. The Record of Decision for Test Area North is scheduled to be issued in September 1999.

Results of the comprehensive investigation for the Idaho Nuclear Technology and Engineering Center were issued in a Proposed Plan. The plan included a preferred alternative that proposed the creation of an on-site disposal facility at the Idaho Nuclear Technology and Engineering Center for some cleanup-related waste from the INEEL. The plan also announced that investigation of contaminated soil at the Idaho Nuclear Technology and Engineering Center tank farm would be conducted as part of a separate action.

A contingency plan was implemented to remediate Pit 9 at the Radioactive Waste Management Complex. Pit 9 represents a small portion (less than 2 percent of the area) of the 88 acres of contaminated pits and trenches at the Radioactive Waste Management Complex Subsurface Disposal Area.

The Environmental Restoration Program logo is an open circle moving in the direction of closure. The grass stem represents the completion of this process. The logo represents:

- Restoration of the land
- Closure of the cleanup cycle
- Openness of the restoration process to public view and input

# Cleanup Overview

## Legend

Sites that may be contaminated are assessed to determine the extent of contamination and the potential risk. Cleanup alternatives are identified and evaluated, resulting in the selection of a preferred alternative.

The public is invited to review and comment on the proposed plans. Following public comment and resolution, the selected remedy is documented in a Record of Decision.

The selected remedy is detailed and carried out.

Routine monitoring is conducted to verify that the remedy remains protective of human health and the environment.

The phase has been completed.

The phase is in progress.

www.inel.gov/environment/em

| Waste Area Group | Records of Decision | Investigation |
|---|---|---|
| 1 | **Test Area North** | |
| | Groundwater Interim Action | ✓ |
| | Groundwater Final Action | ✓ |
| | Comprehensive | ✓ |
| 2 | **Test Reactor Area** | |
| | Warm Waste Pond | ✓ |
| | Perched Water | ✓ |
| | Comprehensive | ✓ |
| 3 | **Idaho Nuclear Technology and Engineering Center** | |
| | Comprehensive | ✓ |
| | Tank Farm | ◆ |
| 4 | **Central Facilities Area** | |
| | Motor Pool Pond | ✓ |
| | Landfills | ✓ |
| | Soil Sites | ✓ |
| | Comprehensive | ◆ |
| 5 | **Power Burst Facility/ Auxiliary Reactor Area** | |
| | PBF Evaporation Pond | ✓ |
| | ARA Chemical Evaporation Pond | ✓ |
| | Stationary Low-Power Reactor-1/ Boiling Water Reactor Experiment | ✓ |
| | Comprehensive | ✓ |
| 6 | **Experimental Breeder Reactor-I/Boiling Water Reactor Experiment** | |
| 7 | **Radioactive Waste Management Complex** | |
| | Pit 9 | ✓ |
| | Pad A | ✓ |
| | Vadose Zone | ✓ |
| | Pits and Trenches | ◆ |
| | Comprehensive | ◆ |
| 8 | **Naval Reactors Facility** | |
| | Industrial Waste Ditch | ✓ |
| | Comprehensive | ✓ |
| 9 | **Argonne National Laboratory–West** | |
| | Comprehensive | ✓ |
| 10 | **Miscellaneous Sites and Snake River Plain Aquifer** | |
| | Unexploded Ordnance | ✓ |
| | Comprehensive | ◆ |

| Public Comment and Decision | Remedial Design and Action | Ongoing Maintenance/ Monitoring | Comments |
|---|---|---|---|
| | | | |
| ✓ | ✓ | ✓ | Action completed; routine monitoring ongoing |
| ✓ | ◇ | ◇ | Hotspot containment, bioremediation study and groundwater monitoring in progress |
| ◇ | | | Record of Decision expected in 1999 |
| | | | |
| ✓ | ✓ | ◇ | Action completed; routine monitoring ongoing |
| ✓ | ✓ | ◇ | Action completed; routine monitoring ongoing |
| ✓ | ◇ | | Cleanup in progress |
| | | | |
| ◇ | | | Record of Decision expected in 1999 |
| | | | |
| ✓ | N/A | N/A | Investigation determined no action was necessary |
| ✓ | ✓ | ◇ | Action completed; routine monitoring ongoing |
| ◇ | | | Public comment scheduled for Summer 1999 |
| | | | Record of Decision scheduled for 2002 |
| | | | |
| ✓ | ✓ | ◇ | Action completed; routine monitoring ongoing |
| ✓ | N/A | N/A | Investigation determined no action was necessary |
| ✓ | ✓ | ◇ | Action completed; routine monitoring ongoing |
| ◇ | | | Public comment period May 1999 |
| | | | |
| See Waste Area Group 10: Miscellaneous Sites and Snake River Plain Aquifer | | | |
| | | | |
| ✓ | ◇ | | Contingency plan in progress |
| ✓ | ✓ | ◇ | Action completed; routine monitoring ongoing |
| ✓ | ◇ | | Vapor vacuum extraction in progress |
| | | | Concurrent with the comprehensive investigation |
| | | | Scheduled for completion in 2003 |
| | | | |
| ✓ | ✓ | ◇ | Action completed; routine monitoring ongoing |
| ✓ | ◇ | | Cleanup in progress |
| | | | |
| ✓ | ◇ | | Cleanup in progress |
| | | | |
| ✓ | ◇ | | Cleanup in progress |

# Test Area North (Waste Area Group 1)

Established in 1954, Test Area North has supported the Aircraft Nuclear Propulsion Program, the Loss-of-Fluid Test Facility and the investigation of core material from the damaged Three Mile Island reactor. The main sources of contamination at Test Area North include discharges to an injection well, releases during transfers to and from underground storage tanks, windblown contaminants from another release site, releases in disposal (burn) pits, releases to surface ponds, a mercury spill and a fuel leak.

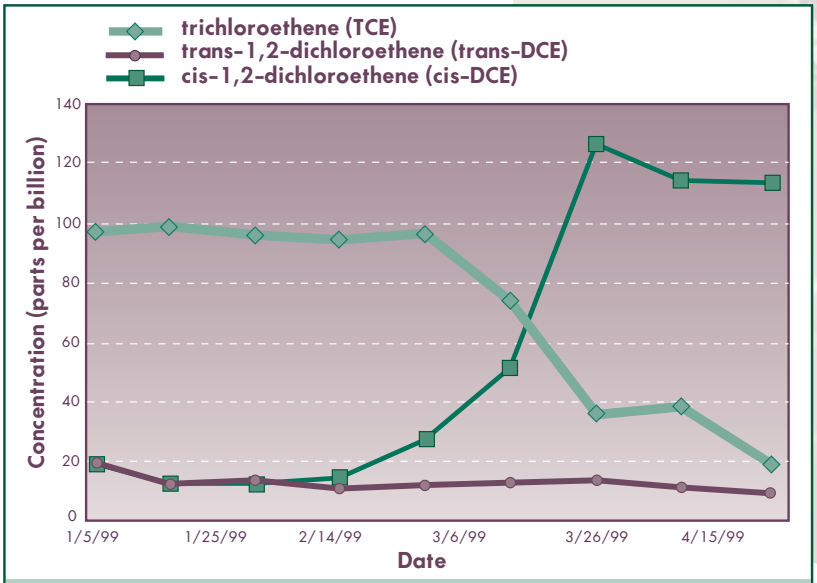
## 1998 Accomplishments

- Issued a Proposed Plan for the comprehensive investigation and a revised Proposed Plan incorporating public feedback and suggestions
- Began bioremediation field test for contaminated groundwater

Sixty-two sites of known or suspected contamination at Test Area North were evaluated in a comprehensive investigation completed in late 1997. A Proposed Plan describing this investigation was issued in February 1998. Feedback from the public and the INEEL Citizens Advisory Board resulted in withdrawal of the original Proposed Plan. A public focus group was formed to provide input to improve the Plan while a technical revisions were made in a Feasibility Study Supplement. In November 1998, a revised Proposed Plan and Feasibility Study Supplement were issued, incorporating feedback from the focus group and the public.

A Record of Decision for the comprehensive investigation, incorporating input received during the public comment period, is expected to be issued in September 1999. The Record of Decision will describe how nine contaminated sites will be remediated. These sites include underground storage tanks, contaminated soil areas, a disposal pond, burn pits, a mercury spill area and a fuel leak.

Under a separate action for groundwater, scientists and engineers are evaluating several technologies to remove the organic chemical trichloroethene from groundwater at Test Area North as possible alternatives to the pump-and-treat remedy selected in a 1995 Record of Decision. These technologies include bioremediation, natural attenuation and in situ chemical oxidation. Laboratory and initial field studies indicate that bioremediation is effective. Bioremediation, as applied at Test Area North, uses native microbes present in the subsurface. When the microbes are provided with lactate (a byproduct of fermented sugar) injected into the ground, they can break down trichloroethene. Bioremediation has reduced the level of TCE by more than 75 percent in one test well.




Chloroethenes in Well TAN-31 after lactate additions.

## 1999 Goals

- Issue Record of Decision for the comprehensive investigation
- Complete groundwater bioremediation field test
- Continue groundwater natural attenuation treatability study
- Continue planning for evaluation of in situ chemical oxidation

1 800 708-2680

# Test Reactor Area (Waste Area Group 2)

## 1998 Accomplishments

- Continued monitoring and review of contaminated perched water
- Completed remedial design activities for eight contaminated sites, including the Warm Waste Pond

The Test Reactor Area was established in the early 1950s to study the effects of radiation on materials, fuels and equipment. The main sources of contamination at the Test Reactor Area include waste disposal ponds, storage tanks and sewage lagoons. Seepage from waste disposal ponds contaminated groundwater beneath the Test Reactor Area. Major contaminants include metals, radionuclides and organic chemicals such as polychlorinated biphenyls (PCBs).

Cleanup of the eight remaining Test Reactor Area contaminated sites will begin in 1999, with completion planned for October 1999. Cleanup actions will consist of covering contaminated soil at three sites, excavating and disposing of contaminated soil at one site and implementing institutional controls and monitoring at all eight sites.

## 1999 Goals

- Implement cleanup actions at eight sites of contamination (completion scheduled for October 1999)

Spraying surfactant to control dust on the Warm Waste Pond.

# Idaho Nuclear Technology and Engineering Center (Waste Area Group 3)

## 1998 Accomplishments

- Issued a Proposed Plan for the comprehensive investigation
- Began investigation of contaminated soil at the tank farm

The Idaho Nuclear Technology and Engineering Center, previously known as the Idaho Chemical Processing Plant, was constructed in 1952 to reprocess spent nuclear fuel. Reprocessing, discontinued in 1992, resulted in high-level liquid waste. The INEEL calcines (evaporates and oxidizes) this waste into a granular solid that is safer and easier to store. About 95 percent of the contamination at the Idaho Nuclear Technology and Engineering Center originated at its underground tank farm. Other sources included an injection well (sealed in 1989) that contaminated groundwater beneath the INEEL, soils beneath buildings and waste disposal ponds. Major contaminants included metals, radionuclides, organic chemicals and nitrates.

There are 95 sites of known or suspected contaminant release at the Idaho Nuclear Technology and Engineering Center. These were evaluated in a comprehensive investigation and summarized in a Proposed Plan issued in October 1998. The Proposed Plan identified 44 sites requiring cleanup. Of these 44 sites, 40 will be addressed in a Record of Decision expected to be issued in August 1999. The other four will be managed under other INEEL environmental programs. The Proposed Plan also included a preferred alternative that would create a large, on-site disposal facility at the Idaho Nuclear Technology and Engineering Center for cleanup-related waste from the INEEL.

In 1998, the DOE, the EPA and the state of Idaho agreed to investigate contaminated soil at the tank farm as a separate remedial investigation and feasibility study. This investigation will continue in 1999 and will result in a separate Record of Decision scheduled for 2004. While this investigation is underway, an interim action consisting of institutional controls will be undertaken to minimize contaminant exposures and limit effects on soil and groundwater until a cleanup action is completed.


- Issue Record of Decision for comprehensive investigation
- Continue investigation of contaminated soil at tank farm
- Begin interim action to limit spread of contamination at tank farm

## Central Facilities Area (Waste Area Group 4)

The Central Facilities Area was established in the 1940s to provide centralized support for the INEEL (then a U.S. Navy gunnery range and later the National Reactor Testing Station). Its facilities include construction and craft shops, warehouses, landfills, research laboratories, a cafeteria and emergency services. The main sources of contamination include landfills, a waste disposal pond, a wastewater drainfield and underground storage tanks. Major contaminants include metals, radionuclides and nitrates.

### 1998 Accomplishments

- Completed cleanup actions at five sites, including excavation of 11,700 cubic yards of petroleum-contaminated soil
- Continued groundwater monitoring and maintenance of landfill covers

In 1998, a comprehensive investigation for the Central Facilities Area neared completion. It identified three sites that require cleanup: a waste disposal pond, a drainfield and a storage yard. In the course of this investigation, however, groundwater monitoring detected nitrate contamination that exceeds drinking water standards. Investigating the nitrate contamination will require 2 more years. Accordingly, publication of the comprehensive investigation will wait until the groundwater investigation is completed, currently scheduled for 2002.

An interim action will be conducted to address the other three sites while the groundwater investigation is underway. A Proposed Plan for the interim action is scheduled for release in August 1999. The Record of Decision is expected in Winter 1999.


- Issue interim action Proposed Plan and Record of Decision for the three sites requiring cleanup
- Investigate nitrate contamination in the groundwater

# Power Burst Facility/Auxiliary Reactor Area (Waste Area Group 5)

## 1998 Accomplishments

- Removed asbestos waste adjacent to a waste disposal pond at the Auxiliary Reactor Area
- Investigated soil contamination at the Stationary Low-Power Reactor-I site through drilling and sampling of soil
- Completed an engineered cover for the Stationary Low-Power Reactor-I burial ground
- Completed the comprehensive investigation for the Power Burst Facility/Auxiliary Reactor Area

The Power Burst Facility/Auxiliary Reactor Area was established in the late 1950s to research reactor safety and small power reactors. The main sources of contamination include underground tanks, hot cells, waste disposal ponds, a sewage system and buried reactor debris. Contaminants include heavy metals, radionuclides and organic chemicals including PCBs.

In 1998, a comprehensive investigation for the Power Burst Facility/Auxiliary Reactor Area was completed. A Proposed Plan summarizing the investigation was issued in May 1999. The Record of Decision is scheduled to be issued in late 1999.

The comprehensive investigation identified seven sites that require cleanup: three waste disposal ponds, soil containing windblown radionuclides, soil beneath now-dismantled hot cells and a sanitary waste system at an underground tank. The investigation proposes using a segmented gate system to clean up contaminated soil at this area. This system separates soil that is contaminated from soil that is acceptable to return to the environment. The segmented gate system could significantly reduce the cost of cleanup and the amount of material that requires regulated disposal. A treatability study, which will investigate whether the segmented gate system is suitable for cleaning up contaminated soil at the Power Burst Facility/Auxiliary Reactor Area, is scheduled to begin in June 1999.

A segmented gate system. A system similar to this one will be used at the Power Burst Facility.

### 1999 Goals

- Issue Proposed Plan for comprehensive investigation
- Begin treatability study using segmented gate system for contaminated soils

# Experimental Breeder Reactor–I/ Boiling Water Reactor Experiment (Waste Area Group 6)

The Experimental Breeder Reactor-I/Boiling Water Reactor Experiment was originally constructed to house test reactors that have since been decommissioned. The Experimental Breeder Reactor-I is now a National Historic Landmark open to the public. No operations other than monitoring currently take place in this area.

The comprehensive investigation for this area has been combined with the Miscellaneous Sites and Snake River Plain Aquifer (Waste Area Group 10) comprehensive investigation.

# Radioactive Waste Management Complex (Waste Area Group 7)

The Radioactive Waste Management Complex was established in 1952 as a disposal site for solid, low-level radioactive waste generated at the INEEL and other DOE sites. Waste was disposed in 20 pits, 58 trenches, and 21 soil vault rows. The main sources of contamination are subsurface disposal areas. Groundwater beneath the Radioactive Waste Management Complex has been contaminated with solvents leaking from organic waste. Major contaminants include organic chemicals, nitrate salts, metals and radionuclides.

Removal and destruction of organic chemical vapors from soils beneath the Radioactive Waste Management Complex continued in 1998. The vapors are removed using a vacuum extraction system. This system is designed to remove organic chemical vapors before they can contaminate the Eastern Snake River Plain Aquifer. Since the system began operations in 1996, more than 50,000 pounds of chemicals have been removed and destroyed.

Also in 1998, a subcontract for remediation work at Pit 9 was terminated and a contingency plan was implemented to continue cleanup of the pit. Stage 1 of the contingency plan, currently in progress, includes exploration and core drilling to obtain waste samples, characterization of the samples and bench-scale treatability studies of the samples.

## 1998 Accomplishments

- Continued removing organic chemical vapors from the vadose zone; since 1996, more than 50,000 pounds of chemicals have been removed and destroyed
- Selected permanent waste cleanup technologies for evaluation
- Implemented a contingency plan for Pit 9 and completed a full-scale waste-treatment conceptual design
- Began quarterly sampling the Eastern Snake River Plain Aquifer in and near the Subsurface Disposal Area following the detection of trace radionuclides

An ongoing comprehensive investigation is scheduled for completion in 2002. Following the period of public comment, the Record of Decision is scheduled to be issued in 2003. In late 1998, several technologies for permanent cleanup of the Radioactive Waste Management Complex were selected for treatability studies:

In situ vitrification – Buried waste, waste containers and contaminated soils are melted in place using electrical currents creating a glass-like monolith that traps radionuclides and metals in place. Most organic chemicals are either vaporized and removed, or destroyed by heating.

In situ grouting – Portland cement or a similar material is injected under high pressure into a buried waste area, penetrating waste containers and incorporating waste and surrounding soil into a seamless monolith. The monolith reduces contaminant mobility. In situ grouting has been tested at the complex's Acid Pit with positive results.

In situ thermal desorption – Waste and contaminated soil are heated in place using electrical elements, vaporizing or destroying most organic chemicals. A vapor vacuum extraction system then removes the vapors and treats them at the surface. In situ thermal desorption would enhance effectiveness of the existing vapor vacuum extraction system.

Ex situ electrochemical soil treatment – Excavated soil is saturated with brine and soluble radionuclides are precipitated on an electrode, reducing waste volume.

Ex situ magnetic soil separation – Excavated soil is passed through a powerful, high-grade magnet to remove magnetic forms of radionuclides, reducing waste volume.

A drill rig is used to obtain waste samples at the Radioactive Waste Management Complex.

These technologies will be tested for their ability to penetrate intact, buried containers, their ability to reduce contaminant mobility, and their long-term effectiveness, safety of use and cost. Tests planned for 1999 include large-scale tests on simulated buried waste. In addition, five other new technologies will be monitored for their potential application.

Throughout 1998, the INEEL held briefings to update Idaho's citizens on cleanup activities at the Radioactive Waste Management Complex. Briefings were held for civic groups and tribal and local governments throughout Idaho.

1999 Goals

- Conduct bench-scale and large-scale treatability studies of permanent cleanup technologies for buried waste and contaminated soils
- Remove and characterize waste from Pit 9, and conduct bench-scale treatability studies

## Naval Reactors Facility
### (Waste Area Group 8)

**1998 Accomplishments**

- Continued monitoring and maintenance at three landfills
- Issued Record of Decision for the comprehensive investigation

The Naval Reactors Facility was established in 1949 as a testing and training facility for the U.S. Naval Nuclear Propulsion Program. The Expended Core Facility, which receives, inspects and conducts research on spent nuclear fuel from the U.S. Navy, is currently in operation. The main sources of contamination include tile drainfields and waste disposal basins. Major contaminants include metals and radionuclides.

During 1998, monitoring and maintenance continued at three landfills that were contained with engineered covers in 1996. This work consisted of maintaining the landfill covers and monitoring groundwater contamination beneath the site.

A Record of Decision for the comprehensive investigation of the Naval Reactors Facility was signed in September 1998. It addressed 64 remaining sites, of which 9 require cleanup. Cleanup work at these sites, which will include excavation and disposal of contaminated soil and construction of engineered covers, is scheduled to begin in late Summer 1999. Design work for these cleanup actions is currently in progress.

1999 Goals

- Begin cleanup actions at the nine sites identified in the comprehensive investigation

Aerial photo of the Naval Reactors Facility.

# Argonne National Laboratory–West
## (Waste Area Group 9)

Argonne National Laboratory-West was established in 1957 to test nuclear reactors and reactor safety systems. The main sources of contamination include an industrial waste pond and industrial waste ditches, sanitary sewage lagoons and a storm water canal. Major contaminants include metals and radionuclides.

### 1998 Accomplishments

- Completed removal action for unexploded ordnance

In September 1998, the DOE, EPA and state of Idaho signed the comprehensive investigation Record of Decision for Argonne National Laboratory–West, which identified five sites requiring cleanup. The Record of Decision identified phytoremediation as the preferred method for removing contaminants from the soil at these sites.

Phytoremediation is the use of plants to remove contamination from soil through their root systems. The plants uptake the contaminants and store them in their roots, stems or leaves. The plants are periodically harvested, dried, packaged and incinerated. The resulting ash is sampled, analyzed and disposed of at an appropriate disposal facility.

Studies in 1998 indicated that phytoremediation would be effective at the five sites for which it was recommended, except for portions of two sites that are significantly contaminated with mercury and chromium. Phytoremediation would not be effective at these locations because the plants do not extract mercury and chromium at a rate that would cleanup the soils as quickly as desired (less than 10 years). The approximately 100 cubic yards of contaminated soils that are not appropriate for phytoremediation will be excavated and disposed of at an appropriate disposal facility.

Phytoremediation began at Argonne National Laboratory–West in May 1999.

### 1999 Goals

- Begin phytoremediation at five sites
- Excavate mercury- and chromium-contaminated soil at two sites where phytoremediation will not be effective

Phytoremediation is the use of plants to clean up soil.

# Miscellaneous Sites and Snake River Plain Aquifer
## (Waste Area Group 10)

### 1998 Accomplishments

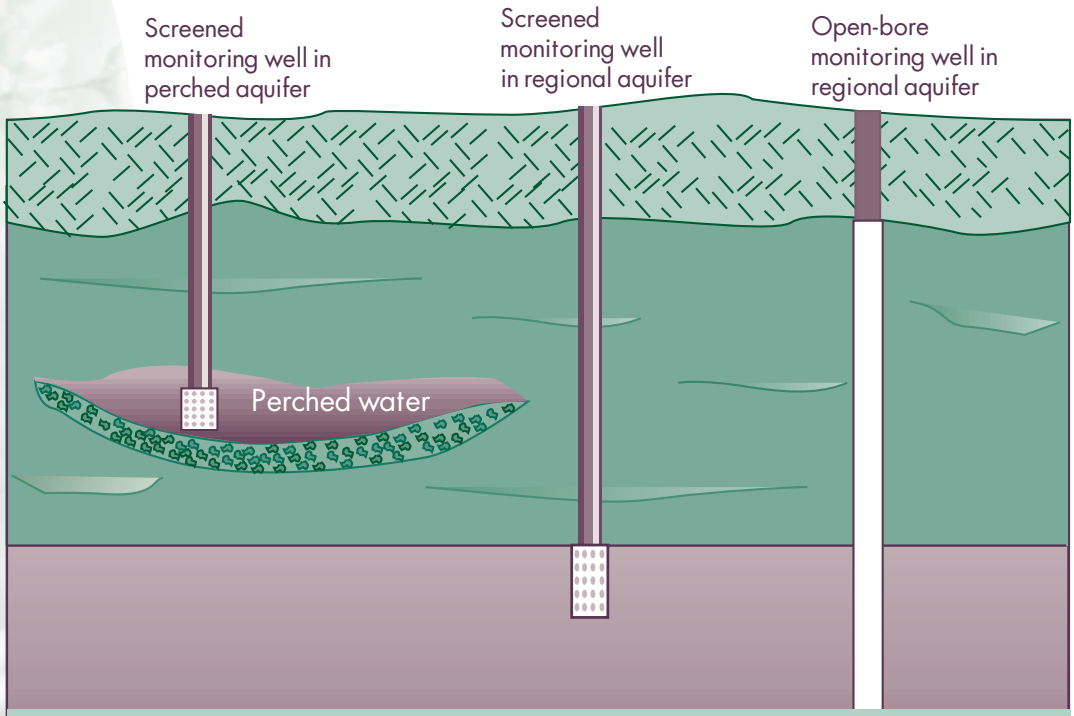
- Issued Record of Decision for the comprehensive investigation
- Completed phytoremediation trials for removing soil contaminants at five sites

Waste Area Group 10 includes miscellaneous sites at the INEEL that are not associated with the other nine areas by location or function and sites that are most feasible to manage on an INEEL-wide basis. The boundaries of Waste Area Group 10 are the INEEL boundaries or beyond, as necessary, to encompass actual or potential impact from the INEEL's activities. The Eastern Snake River Plain Aquifer, which underlies the entire INEEL, is part of Waste Area Group 10. The Experimental Breeder Reactor-I/Boiling Water Reactor Experiment (Waste Area Group 6) is being addressed within the Waste Area Group 10 comprehensive investigation. Sources of contamination include a chemical disposal area, a leach pond and a former U.S. Navy ordnance testing area. Major contaminants include metals, radionuclides, explosive compounds and unexploded ordnance.

During 1998, an unexploded ordnance removal action was completed. The comprehensive investigation began in early 1999 with the Record of Decision scheduled for completion in 2002. A separate investigation into sitewide groundwater contamination is scheduled to begin in April 2002. Following a period of public comment, the Record of Decision is scheduled for 2004.

### 1999 Goals

- Begin comprehensive investigation for Waste Area Group 10




Groundwater monitoring wells are used to better understand contamination in the Eastern Snake River Plain Aquifer.

# Decontamination and Dismantlement

The mission of the Decontamination and Dismantlement (D&D) Program is to safely decontaminate, dismantle and dispose of inactive facilities and structures at the INEEL. In the past 21 years, the program has removed more than 100 surplus buildings and structures.

On average, 75 percent of the debris generated by the D&D program is nonradioactive and is disposed of at the INEEL's Landfill Complex. Radioactive waste is disposed of at the Radioactive Waste Management Complex. Mixed low-level waste (hazardous and radioactive components) is treated at the Waste Reduction Operations Complex before disposal at or off the INEEL.

## 1998 Accomplishments

- Began D&D of the old Waste Calcining Facility at the Idaho Nuclear Technology and Engineering Center; work will include filling subsurface structures with grout, demolishing above-surface structures and capping the site with concrete
- Began D&D of the old sewage treatment plant at the Central Facilities Area, including removal of the radioactively contaminated primary clarifier, trickle filter and portions of the sludge drying beds
- Completed detailed characterization of sumps and pits at the old sewage treatment plant at the Central Facilities Area (ahead of schedule)
- Began D&D of Auxiliary Reactor Area hot cells
- Removed contaminated concrete from Auxiliary Reactor Area
- Removed mercury-contaminated soil and asbestos from Test Area North
- Removed asbestos from the Security Training Facility

## 1999 Goals

- D&D of the sewage treatment pumphouse and digester tank at the old sewage treatment plant at the Central Facilities Area
- D&D building STF-610 at the Security Training Facility, using explosive cutting
- Continue D&D of old Waste Calcining Facility at the Idaho Nuclear Technology and Engineering Center
- D&D the Certification and Segregation Building (also known as the air support building) at the Radioactive Waste Management Complex
- Characterize sites prior to D&D at the Central Facilities Area, Test Reactor Area, Idaho Nuclear Technology and Engineering Center, Auxiliary Reactor Area/Power Burst Facility and Test Area North
- Continue D&D of the Initial Engine Test facility, a large underground structure at Test Area North

The air support building (in the center) at the Radioactive Waste Management Complex.

The air support building being dismantled.

Artist's rendering of the Advanced Mixed Waste Treatment Facility to be built at the former location of the air support building.

# 1998 Summary of Public Involvement

1998 began with the release of Proposed Plans summarizing two comprehensive investigations: for the Naval Reactors Facility and Argonne National Laboratory–West. In January, public meetings to discuss these plans were held in Boise, Idaho Falls and Moscow.

In February, the Test Area North Proposed Plan, summarizing the comprehensive investigation for this area, was released for public comment. Public meetings were held to discuss the plan. The plan received significant feedback from the public and the INEEL Citizen Advisory Board. In response, a public focus group from throughout the state of Idaho was convened via video conference. The focus group recommended a number of improvements to the plan. Focus group and other public comments were incorporated in a revised Test Area North Proposed Plan released in November 1998.

Also in February, the DOE sought public comments on the *Paths to Closure: Accelerating Cleanup* document. This plan proposed activities and options that could be used to speed up cleanup and improve management of waste throughout the DOE complex. Public comments were incorporated into the final document released in June 1998.

Comments were received from the public on the *Advanced Mixed Waste Treatment Project Draft Environmental Impact Statement* in August. Public meetings were held in Idaho Falls and Twin Falls.

In October, the Proposed Plan summarizing the comprehensive investigation for the Idaho Nuclear Technology and Engineering Center was released for public comment. In November, public meetings to discuss this plan were held in Boise, Idaho Falls, Moscow and Twin Falls.

In addition to these scheduled formal activities, INEEL personnel held briefings for a number of interest groups, civic organizations and local and tribal governments. Topics at these briefings included cleanup activities at the Radioactive Waste Management Complex, Pit 9 and the Idaho Nuclear Technology and Engineering Center, and the status of the Advanced Mixed Waste Treatment Facility. These informal meetings provided opportunities for dialogue that greatly enhanced the INEEL's understanding of the public's concerns.

During 1998, there were 147 scheduled tours at the INEEL with 2,495 visitors. The tour participants came from all 50 states and 26 foreign countries. In addition, the Experimental Breeder Reactor-I had 8,298 visitors during the summer months.

In December 1998, a new Environmental Management web site was launched at **http://www.inel.gov/environment/em.**



The Environmental Management Progress supplement to the *INEEL Reporter* provides an overview of the INEEL storage, treatment and disposal; cleanup; and public involvement activities. The *INEEL Reporter* is a bimonthly DOE newsletter for the public produced by the INEEL Environmental Restoration and Waste Management Programs.

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# Getting Involved

Citizens are encouraged to get involved in decision-making at the INEEL by reviewing and commenting on documents, attending public meetings and requesting briefings and tours.

## More Information

There are several ways to obtain information about INEEL storage, treatment and disposal; cleanup; and decontamination and dismantlement activities. The documents referenced in this progress report, as well as other related documents, are available to the public within the INEEL *Administrative Record* on the Internet at **http://ar.inel.gov/home.html** and at the following locations:

| | | |
|---|---|---|
| INEEL Technical Library<br>DOE Public Reading Room<br>1776 Science Center Drive<br>Idaho Falls, ID 83415<br>208-526-1185 | Albertsons Library<br>Boise State University<br>1910 University Drive<br>Boise, ID 83725<br>208-385-1621 | University of Idaho Library<br>University of Idaho Campus<br>434 2nd Street<br>Moscow, ID 83843<br>208-885-6344 |

## Toll-Free Phone Number

To request specific documents; request a speaker or briefing on a particular topic; inquire about public meetings or public comment periods; schedule a tour of INEEL; or request other information, call the INEEL toll-free number at (800) 708-2680.


## INEEL Community Relations Offices

The INEEL Community Relations Office is located in Idaho Falls and can provide information and briefings on environmental topics. Call (208) 526-4700 or (208) 526-0075. There is also an INEEL Regional Office in Boise that can provide information and other resources. The office is located at 805 West Idaho Street, Suite 301, Boise, Idaho 83703, or call (208) 334-9572.

## Internet

The INEEL home page is on the Internet at: **http://www.inel.gov.**

The INEEL's Environmental Management information on storage, treatment, disposal and cleanup of waste managed at the INEEL is available at: **http://www.inel.gov/environment/em.**


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